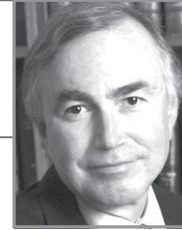


FAILED ACL RECONSTRUCTION IN FOOTBALL PLAYERS

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Background

In 2013, football was the cause of in 34% of Anterior Cruciate Ligament (ACL) injuries in women and 48% in men according to the Swedish registry. Modern ACL Reconstruction (ACLR) techniques result in clinically stable ligament reconstruction in the majority of cases; however, failed reconstruction continues to be a problem.

What have we learned over the last 30 years of Revision ACLR?

Reasons for failures

Numerous authors have described causes of failed ACL reconstruction.

1. Tunnel malposition: non-anatomical tunnel position, particularly on the femoral side, has been associated with poorer control of tibial rotation and abnormal knee kinematics. Tunnel malposition can also lead to graft impingement, potentially limiting motion through formation of a Cyclops lesion or increasing failure risk through graft abrasion.
2. Traumatic re-injury - many of these failures may be unavoidable. The use of braces has not been definitively shown to decrease the risk of traumatic re-injury.
3. Failure to address associated injuries and deformities - failure to recognize associated laxity is a frequent cause of ACLR failure. Associated posterolateral instability is typically cited as the most commonly missed injury.
4. The meniscus is critical (Trojani et al. *Knee Surg Sports Traumatol Arthrosc* 2011; 19: 196-201); loss of meniscal tissue, particularly medially, increases the load borne by the ACL, potentially increasing failure risk.

Discrepancy between ACLR failure risk and the frequency of revision ACLR

Despite of the relatively high risk of clinical failure of ACLR (up to 28% in young, active populations), revision reconstructive procedures are less frequently performed (2 to 10% of patients). The reasons for this discrepancy include decreased patient activity level and expectations, patients' hesitation to undergo another surgical procedure, and concern on the part of surgeons and patients as to whether a revision would improve functional results.

Outcomes

Several large series reporting the results of revision ACLR have been published, with generally poorer results than in cases of primary reconstruction. Poorer outcomes are likely secondary to poorer control of tibial translation and rotation following revision surgery as well as the increased incidence of meniscal and articular cartilage injuries noted in this population.

Some authors have reported elevated failure risk (up to 3-4 times the risk) after revision ACLR compared to primary ACLR (Gifstad et al. *Knee Surg Sports Traumatol Arthrosc* 2013; 21(9): 2011-2018). However, Shelbourne et al. (*Am J Sports Med* 2014; 42(6): 1395-1400) reported a re-injury risk within the first 5 years after revision surgery that ranged from 2% to 5%, which is lower than reported for young, competitive athletes after primary surgery. These differences in outcome may be related to post-op activity level and expectations.

Expectation and satisfaction

Patients undergoing revision ACLR should be explicitly counselled regarding appropriate expectations following revision surgery given the documented increased laxity and poorer outcomes of this procedure. A frank discussion about realistic goals and expectations following revision surgery is critical to prevent postoperative patient dissatisfaction despite a successful result from the surgeon's perspective (Feucht et al. *Knee Surg Sports Traumatol Arthrosc* 2014 Oct 2. [Epub]).

Return to sports

Literature is limited and few articles focus on football. According to a meta-analysis by Arden et al. (*Br J Sports Med*. 2014; 48: 1543-1552), 81% of athletes returned to any level of sport, 65% returned to their pre-injury level of sport, and 55% returned to competitive level sports after ACLR. Elite athletes had approximately six times the odds (OR=5.9) of returning to competitive sport compared to non-elite athletes.

Fear of re-injury

Flanigan et al. (*Arthroscopy* 2013; 29:1322-1329) investigated factors that influence return to sport following ACLR. They found that 56% of patients failed to return to their pre-injury activity level. A majority of patients who did not return to their pre-injury activities cited persistent knee symptoms, particularly pain, as a contributing factor and only a minority cite job and family demands or a lack of interest. Fear of re-injury was cited as a factor by over half of the patients who did not return to sports.

Prevention

Preventive training programs have been designed to identify at-risk athletes and intervene to reduce risk. A variety of programs have been developed, with varying levels of success. All generally focus on improving balance and proprioception in the lower extremities, addressing strength imbalances, and teaching and practicing movement patterns that avoid positions in which an ACL injury is more likely to occur. These training programs can also be considered following rehabilitation after ACLR, but evidence as to their effectiveness in these situations is limited.

Group at risk

Specific groups that have been identified as having increased risk of ACLR failure include younger athletes and those returning to higher demand sports such as football. Andernord et al. (*Am J Sports Med* 2014; 42: 1574-1582) found that football players and adolescents had an increased risk of revision surgery after ACLR with a respective factor of 1.5 and 2.5. Data are mixed regarding the influence of patient sex and ACL graft choice on failure risk.

Repeat Revision ACL reconstruction

Several case series on this subject have reported acceptable results, particularly when previously missed concurrent injuries are addressed. Appropriate patient expectations and post-operative activities are especially important in this challenging population.